PCT/GB 2003 / 0 0 1 7 6 8

The Patent Office

PATENTS • DESIGNS • COPYRIGHT • TRADE MARKS

REC'D 16 MAY 2003

WIPO PCT

INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

PRIORITY DOCUMENT

SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed [signature]

Dated 17 April 2003

Patents Form 1/77

Patents Act 1977
(Rule 16)

The Patent Office

THE PATENT OFFICE
25 APR 2002
RECEIVED BY HAND

1/77

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Concept House
Cardiff Road
Newport
South Wales NP10 8QQ

1.	Your reference	TAB/59710/000
		26APR02 E714214-1 D02882 P01/7700 0.00-0209564.4
2.	Patent application number *(The Patent Office will fill in this part)*	25 APR 2002 0209564.4
3.	Full name, address and postcode of the or of each applicant *(underline all surnames)*	DE LA RUE INTERNATIONAL LIMITED De La Rue House Jays Close Basingstoke Hants. RG22 4BS United Kingdom
	Patents ADP number *(if you know it)*	7563612001
	If the applicant is a corporate body, give the country/state of its incorporation	England
4.	Title of the invention	Improvements in Substrates
5.	Name of your agent *(if you have one)*	BOULT WADE TENNANT
	"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*	VERULAM GARDENS 70 GRAY'S INN ROAD LONDON WC1X 8BT
	Patents ADP number *(if you know it)*	42001
6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number	Country / Priority application number (if you know it) / Date of filing *(day/month/year)*
7.	If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application	Number of earlier application / Date of filing *(day / month / year)*
8.	Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if: a) any applicant named in part 3 is not an inventor, or b) there is an inventor who is not named as an applicant, or c) any named applicant is a corporate body. See note (d))*	n

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	18
Claim(s)	4
Abstract	0
Drawing(s)	11

10. If you are also filing any of the following, state how many against each item.

Priority documents	0
Translations of priority documents	0
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	0
Request for preliminary examination and search *(Patents Form 9/77)*	1
Request for substantive examination *(Patents Form 10/77)*	1
Any other documents *(Please specify)*	0

11 I/We request the grant of a patent on the basis of this application.

Signature

Date

25 April 2002

12. Name and daytime telephone number of person to contact in the United Kingdom

Tessa A Bucks
020 7430 7500

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents ct 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) *If you need help to fill in this form or you have any questions, please contact the Patent Office on 01645 500505.*

b) *Write your answers in capital letters using black ink or you may type them.*

c) *If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.*

d) *If you have answered 'Yes' Patents Form 7/77 will need to be filed.*

e) *Once you have filled in the form you must remember to sign and date it.*

f) *For details of the fee and ways to pay please contact the Patent Office.*

DUPLICATE

IMPROVEMENTS IN SUBSTRATES

The invention relates to improvements in substrates and in particular to new substrates having security features, which provide security against imitation.

It is widely known to use in banknotes and other security documents security elements, such as security threads or strips. These threads are partially or wholly embedded in a paper or plastic substrate, and generally provide different viewing conditions depending on whether the security document is viewed in transmitted or reflected light.

EP-A-319157, for example, describes a security element made from a transparent plastic film provided with a continuous reflective metal layer, such as aluminium, which has been vacuumed deposited on the film. The metal layer is partially demetallised to provide clear demetallised regions which form indicia. When wholly embedded within a paper substrate the security element is barely visible in reflected light. However, when viewed in transmitted light the indicia can be clearly seen highlighted against the dark background of the metallised area of the thread and adjacent areas of the paper. Such threads can also be used in a security document provided with repeating windows in at least one surface of the paper substrate at which the security thread is exposed. A security document of this type, when viewed in transmitted light, will be seen as a dark

line with the indicia highlighted. When viewed in reflected light on the windowed side, the bright shiny aluminium portions are readily visible in the windows. This thread has been highly successful within the market place and is supplied under the trade mark Cleartext®.

For a number of years banknote issuing authorities have had an interest in combining both the public recognition properties of Cleartext® with the covert properties of a machine readable feature. To this end it is preferable to utilise machine readable features that can be read using detectors already available to the banknote issuing authorities. Examples of such machine readable devices are described in WO-A-92/11142 and EP-A-773872.

The security device of WO-A-92/11142 is an attempt to provide this combination. A security device conforming to this specification has been used commercially with some success. A central region of the security device has a metallic appearance with clear regions forming characters; on either side of this central strip in the width direction, there are layers of magnetic material with obscuring coatings to provide the necessary magnetic component. This is, however, a generally unsatisfactory means of achieving the combination of the appearance of Cleartext® with the required magnetic properties. The magnetic properties are satisfactory, but the requirement to place the magnetic layers on either side of a central region means

that the latter must be relatively narrow with respect to the overall thread width and results in characters which are small, typically 0.7mm high, and therefore not easily legible. Additionally, the structures of the devices described in WO-A-92/11142 are very complex and present substantial lateral registration problems in depositing the various layers; a misregistration of even 0.1mm or so can allow the presence of the dark magnetic oxide to be apparent to the naked eye, thus revealing its presence and seriously detracting from the aesthetic appearance of the security thread.

A more satisfactory solution, from the processibility, ease of character recognition and aesthetics points of view, would be to manufacture a device of the kind described in EP-A-0319157 from a metal which is itself magnetic such that the size of the characters and ratio of character height:thread width of the Cleartext® product is maintained, whilst providing direct compatibility with existing magnetic thread detectors. One means of achieving this is disclosed in Research Disclosure No. 323 of March 1991. In this Research Disclosure, a magnetic material is deposited onto a flexible substrate by vacuum sputtering or other known techniques; the non-metallised regions are created by selective printing of a resist layer and subsequent chemical etching. The disclosed magnetic materials may be nickel, cobalt, iron or alloys thereof with a preferred combination of cobalt:nickel in the ratio 85:15%. The disadvantage of this method is that vacuum

deposition of cobalt:nickel to the necessary thickness is a relatively slow process and somewhat wasteful of cobalt, an expensive material. Furthermore, subsequent to this vacuum deposition process, further significant processing is required to etch the characters. The resultant product is therefore relatively expensive.

A further alternative approach is described in EP-A-773872 wherein a magnetic metal is deposited on a film of polymeric substrate as the substrate passes through a solution containing the magnetic metal, and a preparatory operation is carried out on a surface of the substrate prior to immersion of the substrate in the solution. The preparatory operation ensures that magnetic metal is deposited on the substrate in a chosen pattern such that when the security product is produced from the film by cutting the film, the magnetic metal on the security thread has a specific pattern and provides both a visual discernible security feature and a magnetically detectable security feature. This method produces a security thread with satisfactory visual and machine readable characteristics but the manufacture is not straight forward and is costly.

One further approach is detailed in WO-A-9928852. Here the security device includes a carrier substrate, a metallic layer disposed on the carrier substrate, and a magnetic layer disposed on the metallic layer in substantial registration with at least a portion of the metallic layer, thereby providing both metallic security

features and magnetic security features. The metallic layer and the magnetic layer also form graphic or visually identifiable indicia on the carrier substrate to provide a visual security feature. According to one method, the metallic layer is applied to the carrier substrate, the magnetic layer is applied to the metallic layer, and the layers are etched to form the graphic indicia. The magnetic layer can, in one embodiment, include a magnetic chemical resist that is printed on the metallic layer in the form of the graphic indicia. This method again produces a security device with acceptable visual and magnetic characteristics but again has a high cost with regard to processing and production.

The present invention therefore seeks to provide a security substrate that may be slit into security threads for partially or wholly embedding into paper or polymer which has acceptable magnetic and visual characteristics as described above and also greatly simplifies the manufacturing process. Such a simplification produces costs savings for both manufacture and materials as levels of spoil are greatly reduced.

A preferred embodiment of the present invention will now be described by way of example only, with reference to the accompanying drawings in which:-

Figures 1, 1A, and 1B are cross-sectional side elevations of a substrate according to the present invention;

Figure 2 is cross-sectional side elevation of an alternative substrate to that shown in Figure 1;

Figures 3, 3A, and 3B are cross-sectional side elevations of further alternative embodiments of the substrate of Figure 1 with an adhesive layer applied, for use in tear tapes;

Figures 4 and 4A are cross-sectional side elevations of other alternative substrates to that shown in Figure 1 with an adhesive applied to the demetallised surface, for use as a tamper evident tear tape;

Figures 5, 5A, and 5B are cross-sectional side elevations of further alternative substrates to that shown in Figure 1 incorporating a high reflective index or polymer liquid crystal layer;

Figures 6, 6A, and 6B are cross-sectional side elevations of further alternative substrates to that of Figure 1, with an HRI or polymer liquid crystal layer, no metallisation and including a print feature;

Figures 7, 7A, 7B and 7C are cross-sectional side elevations of further alternative substrates to those shown in Figures 6, 6A, 6B and 6C, but with the addition of a demetallised layer;

Figures 8, 8A, 8B and 8C are cross-sectional side elevations of an alternative substrate to that shown

in Figures 7, 7A, 7B and 7C with the high refractive index or polymer liquid crystal layer replaced by a second clear polymer layer;

Figures 9, 9A, 9B, and 9C are cross-sectional side elevations of an alternative substrate to that shown in Figure 8 but with the print features located within the demetallised region;

Figures 10 to 12 are cross-sectional side elevations of further alternative substrates incorporating optically variable devices;

Figure 14 is a cross-sectional side elevation of an alternative substrate to that of Figure 13, but with two demetallised layers, one on either side of the transparent magnetic media containing layer; and

Figures 15 and 16 are cross-sectional side elevations of further alternative substrates which are coded.

The present invention makes use of transparent magnetic materials that are now available from a number of suppliers. Examples of such materials are described in US-A-6296996, EP-A-660311, US-A-5520954, EP-A-994386 and US-A-6258519 and references therein. Such materials were originally developed for use within the photographic industry to allow information relating to a visual image to be stored magnetically on the photographic film. In

the most basic form such transparent magnetic media comprises a polymeric film in which have been suspended magnetic particles at such a concentration as to allow the polymeric film to remain transparent. Various other forms of transparent magnetic media are described in the cited prior art any of which would be suitable for the present application. It has been found that the concentration of magnetic material within such films is sufficient to allow detection using existing banknote detection equipment. In particular, the wider the thread, the lower the concentration of magnetic pigment is required for accurate machine detection, due to the fact that the signal recovery is considerably differentiated from the normal cash processing system noise.

Figures 1 and 2 illustrate two embodiments of the present invention. In Figure 1 the transparent magnetic media comprises novel acicular magnetic particles of iron oxide, approximately 200nm in short length and 300-700nm in long length, which are suspended in a varnish (2) which is coated onto a transparent polymer carrier layer (1). The magnetic particles may be black iron oxide, gamma iron oxide, cobalt treated gamma iron oxide, barium or strontium ferrites or metallic iron. Suitable magnetic materials are commercially available from Magnox Inc., Pfizer Pigments Inc or Toda Kogyo Corp., and suitable varnishes (2) include 1462 from Luminescence, VHL 31534 from Sun Chemicals or 31833XSN, 20784XSN and 90838XSN, all from Coates Lorilleux.

A surprising benefit lies in the provision of a distinctive colour or reflection by varying the coat weights of material.

Alternatively, as shown in Fig. 2, the magnetic particles may be incorporated in the polymer layer (6) itself. From herein it should be appreciated that the use of a coated polymer layer (1) or a polymer layer (6) containing the magnetic particles are interchangeable within all the described embodiments.

The transparent magnetic media containing layer (2,6) is preferably vacuum metallised and then selectively demetallised in a known manner to provide indicia, formed by metallised regions (3) and demetallised regions (4).

The resulting substrate can therefore have both public (overt) and machine readable (covert) features, where required, or only covert features in the absence of indicia.

A further polymer layer (5) (12μm polyester for example) may optionally be laminated to cover the metallised and demetallised regions (3,4) to improve durability. The additional polymer layer (5) may or may not contain magnetic particles depending upon requirements.

The thus formed substrate may then be slit in register to form thin strips suitable for inclusion as security threads into banknotes or other security documents. Typical widths for security threads lie in the range 0.5mm to 50mm, and more preferably 1mm to 10mm. The use of the substrate of the present invention is not merely limited to use as security threads, but may also be used to provide other security media such as secure tear tapes for brand protection, or a secure substrate for the manufacture of labels, transfers, hang tags, certificates, bonds, cheques, banknotes and other documents of value. When utilised as a substrate for such applications it is envisaged that an opaque ink receptive coating be applied over at least part of the substrate.

The secure substrate described above can be further enhanced as will be understood by those skilled in the art. Such enhancements include, but are not limited to, the application of luminescent, thermochromic and, photochromic materials and embossed optically variable devices. Examples of how this might be achieved are described in EP-A-319157, GB-A-2274428, WO-A-00/54985, and WO-A-00/39391.

It would also be possible to use the invention to provide a coded security thread using interspersed magnetic and text regions. Additionally, a magnetic layer could be coated onto at least a part of the substrate to provide a magnetic code. Said additional

magnetic layer would preferably contain a magnetic material of different coercivity to that of the substrate film.

The invention will now be described in more detail by reference to the following examples.

Example 1

In a first example, as shown in Fig. 1, the polymer carrier (1) is provided by a 12 μm standard polyester film which is coated at a coat weight of 2gsm with a varnish (2) containing 0.1-50%, more preferably 1-30%, by weight of magnetic material. The lower range of loading can be used where more sophisticated detection equipment is available. Onto this carrier (1) a metallic reflection-enhancing layer, such as aluminium, is applied, although other metals could be used. This metallic layer is printed with a resist layer defining indicia and is then exposed to a caustic etch solution which removes the metal not protected by the resist. The caustic solution is washed away to reveal metallised regions (3) and demetallised regions (4), defining indicia. Alternatively any of the known methods for demetallisation could be used. An additional layer (5) of 12μm polyester is then applied to improve durability of the substrate. The thus formed substrate may then be slit in register to form security threads for inclusion into paper or polymer as described in EP-A-59056 and GB-A-0111452.9 respectively.

Potential alternative constructions are shown in figures 1A and 1B. In both these examples a metallised polymer film e.g. 12 μm metallised Type S from DuPont is demetallised as described above prior to application of the magnetic varnish layer. Figure 1A shows the varnish layer applied onto the demetallised surface and figure 1B shows the varnish layer applied on the opposite side to the demetallised layer.

Example 2

In a second example, as shown in Fig. 3, a layer of a pressure sensitive or hot melt adhesive (7) is subsequently applied to either of the polymer layers (1,5) of the substrate of Example 1, and strips of the substrate may be used as a tear tape for secure packaging.

Figures 3A and 3B show alternative constructions with the varnish layer applied onto the demetallised layer on the opposite side of the demetallised layer.

Example 3

As a further alternative a layer of pressure sensitive or hot melt adhesive (7) may be applied to the partially metallised surface (3,4) as shown in Fig. 4. This provides the additional benefit that tapes made from the substrate now show some tamper evident properties. When such a tape is removed from the packaging or

substrate the metal region (3) will be irreversibly removed to clearly illustrate tampering. A suitable pressure sensitive adhesive would be Indatex SE 5219 (applied at between 1gsm-20gsm, and more preferably at 8gsm) and a suitable hot melt adhesive would be RK14 supplied by De La Rue Holographics.

Figure 4A shows an alternative construction with the varnish layer applied to the opposite side of the demetallised layer.

<u>Example 4</u>

In this example the magnetic particles have been included as part of the polymer carrier layer (6), as shown in Fig. 2. In a typical example, 0.1-50% by weight of magnetic material would be included in the polyester, which is preferably a 12μm film, or more preferably 1-30% by weight of magnetic material. The lower range of loading can be used where more sophisticated detection equipment is available. The polymer can then be further processed as described above.

<u>Example 5</u>

As an alternative a high refractive index (HRI) layer (8) such as ZnS or a polymer liquid crystal layer can be applied in preference to or in addition to the partial metal layer (3,4) as shown in figure 5 to provide an iridescent effect in the metallic regions (3).

Figures 5A and 5B show alternative constructions where the varnish layer is applied onto the partial metal layer or onto the opposite side to the partial metal layer.

Example 6

If no metal layer is present, opaque inks may be printed in selected regions 9 onto the transparent magnetic media containing layer (2,6) to form the indicia, as shown in Figures 6, 6A and 6B, using any of the traditional print processes such as gravure, flexo, intaglio, litho, thermal transfer, dye diffusion and so forth. Additional security can be achieved using iridescent, luminescent (visible or invisible in daylight), optically variable, liquid crystal, thermochromic or photochromic inks in conjunction with, or as an alternative to, the opaque ink. It is preferable that such inks be applied in selected regions of the substrate so as to overlie or highlight the indicia, or even provide additional indicia.

Example 7

The inks described above may also be applied in selected regions (9) in addition to demetallised indicia to further enhance security as shown in Figs. 7, 7A, 7B and 7C with the HRI or Polymer liquid crystal layer (8) applied thereover, or with a second polymer layer (5) as shown in Figs. 8, 8A, 8B and 8C.

Example 8

In this example, as shown in Figs. 9, 9A, 9B, and 9C the printed regions (9) are located within the demetallised regions 4, but not wholly filling them.

Example 9

It is also possible to produce a variant of the invention incorporating an optically variable device such as a hologram, Kinegram or Exelgram. Here an additional embossing lacquer (10) is applied on to the substrate and embossed to provide an embossed surface (11). The reflection enhancing layer may be metal, as shown in Fig. 10, 10A, 10B and 10C, or an HRI layer, as shown in Fig. 11, 11A and 11B.

Figures 10, 10A, 10B, and 10C show alternative constructions for the optically variable device utilising a metallic reflection enhancing layer. Figures 11, 11A and 11B show alternative constructions for utilising the HRI reflection enhancing layer.

Example 10

Figure 12 illustrates an alternative construction whereby the coated film (1,2) is metallised and, selectively demetallised. An embossing lacquer (10) is

applied, which is then embossed. An optional protective polymer layer(s) is applied to the embossed surface (11).

Example 11

Figure 1A illustrates a further alternative construction, which is a variant of that shown in Figure 1, whereby the polymer carrier layer (1) has a metal layer applied thereto which is partially demetallised to form a partially metallised surface (3,4). The varnish (2) containing the magnetic material is then applied to the partially metallised surface (3,4). The additional protective layer (5) is then applied over the layer of varnish (2). Alternatively, the varnish (2) may first be applied to the protective layer (5) and this construction laminated to the partially demetallised structure (3,4).

Example 12

In this example, as illustrated in Figure 14, the substrate has two partially metallised layers (3,4). This is achieved by partially demetallising the first carrier layer (1) and, in a separate process, partially demetallising a second additional carrier layer (5). The magnetic material containing varnish (2) is applied to the partially metallised surface (3,4) of the first layer (1) and a laminating adhesive (12) applied to enable the second layer (5) with its demetallised surface (3,4) to be adhered to the first layer (1).

Example 13

This is an example of a coded thread as mentioned previously and as illustrated in Figure 15. In this example an additional magnetic layer (10) is applied to the transparent magnetic media containing layer (2). The additional magnetic layer (10) is preferably discontinuous and also transparent, but incorporates a material of differing coercivity to that of layer (2). Although it is preferred that the layer (10) is transparent, a non-transparent magnetic material may be used in layer 10. The additional layer (10) may also comprise several different magnetic materials printed sequentially to define a code, either abutting or overlapping to form a continuous layer.

Example 14

This is a further example of a coded substrate, as illustrated in Figure 16, in which the magnetic material containing varnish (2) is applied in a discontinuous manner to define a code. The code may be printed with several materials having different coercivities. In this example the need for an additional magnetic layer as described in Example 14 is removed. However, as with the previous examples, where using materials of differing coercivities, these can be printed in sequence either abutting or overlapping to form a continuous layer. In this Example numeral 11 denotes an uncoated magnetic region.

In all the aforementioned examples it should be noted that, as mentioned in conjunction with Example 12, the demetallised construction consisting of the carrier layer (1) and partially metallised surface (3,4) can be formed separately from the transparent magnetic construction comprising the protective layer (5) with the magnetic material containing varnish (2).

CLAIMS:

1. A security substrate comprising a transparent polymer carrier layer forming a transparent magnetic layer containing particles of the magnetic material.

2. A security substrate as claimed in claim 1 in which the transparent magnetic layer comprises a clear varnish in which are suspended particles of the magnetic material.

3. A security substrate as claimed in claim 1 or claim 2 further comprising indicia formed from a plurality of opaque and non-opaque regions.

4. A security substrate as claimed in claim 3 in which the transparent magnetic layer lies between the carrier layer and the indicia.

5. A security substrate as claimed in claim 3 in which the indicia are formed on the carrier layer and the transparent magnetic layer covers the indicia.

6. A security substrate comprising a transparent magnetic layer provided by a transparent polymer carrier layer in which particles of magnetic material are suspended.

7. A security substrate as claimed in claim 6 further comprising indicia formed from a plurality of opaque and non-opaque regions.

8. A security substrate as claimed in any one of the preceding claims further comprising an additional layer of a transparent polymer laminated to the magnetic layer and/or indicia.

9. A security substrate as claimed in any one of the preceding claims further comprising a layer of adhesive applied to at least one side of the substrate.

10. A security substrate as claimed in any one of claims 3 to 5 or 7 or 8 in which a layer of adhesive overlies the indicia.

11. A security substrate as claimed in any one of the preceding claims further comprising a layer of high refractive index material.

12. A security substrate as claimed in any one of claims 3 to 5 or 7 to 11 in which the indicia are provided by partially demetallising a metal layer, with remaining metal forming the opaque regions and the demetallised regions forming the non-opaque regions.

13. A security substrate as claimed in any one of claims 3 to 5 or 7 to 11 in which the indicia are printed.

14. A security substrate as claimed in any one of the preceding claims further including additional printed regions formed from one or more inks having iridescent, luminescent, optically variable, liquid crystal, thermochromic and/or photochromic properties.

15. A security substrate as claimed in any one of the preceding claims comprising indicia provided by demetallised and metallised regions and printed indicia.

16. A security substrate as claimed in claim 15 in which the printed indicia overlie at least some of the metallic regions.

17. A security substrate as claimed in claim 15 in which the printed indicia lie within the demetallised regions.

18. A security substrate as claimed in any one of the preceding claims further comprising an optically variable device.

19. A security substrate as claimed in claim 18 in which the optically variable device is formed by embossing a layer of embossing lacquer.

20. A security substrate as claimed in claim 19 in which the embossing lacquer lies between the magnetic layer and the indicia.

21. A security substrate as claimed in claim 19 in which the embossing layer lies between the transparent magnetic layer and a layer of high refractive index.

22. A security substrate as claimed in claim 19 wherein the embossing layer overlies the indicia.

23. An elongate security element made by the step of slitting the substrate as claimed in any one of claims 3 to 5 and 7 to 22 in register with the indicia.

24. A security document comprising a paper or polymer substrate incorporating a security thread as claimed in claim 23.

25. A security substrate substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

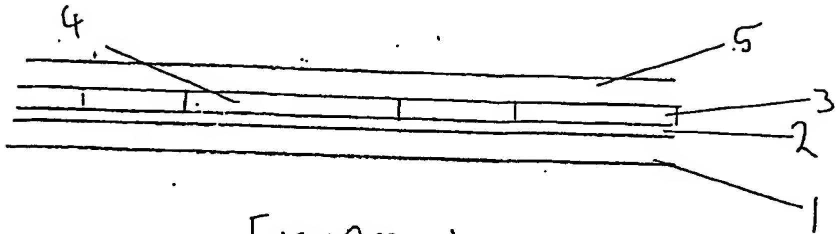

FIGURE 1

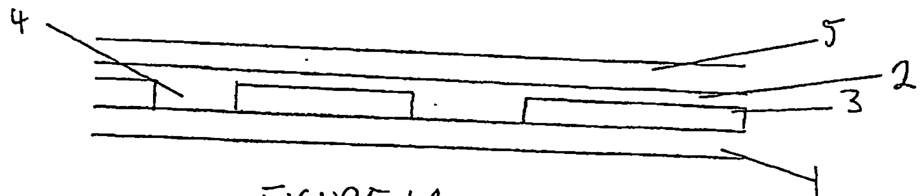

FIGURE 1A

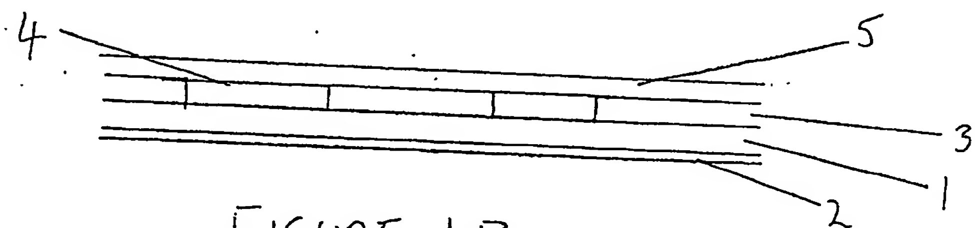

FIGURE 1B

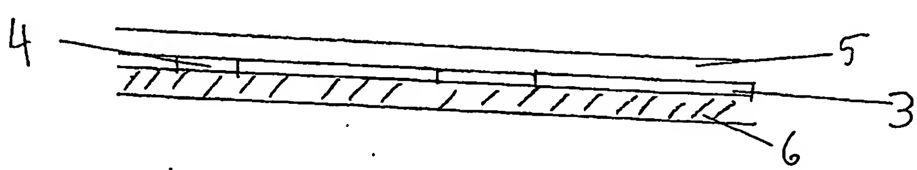

FIGURE 2

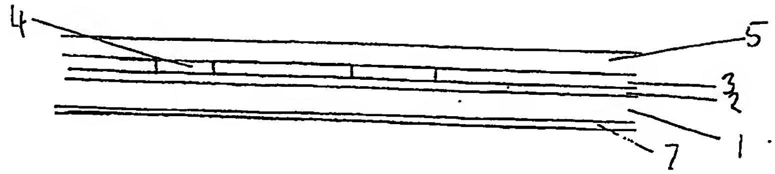

FIGURE 3.

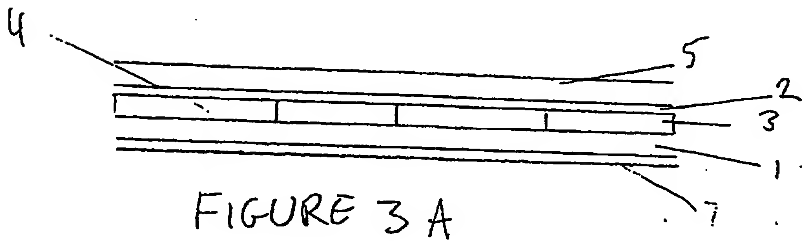

FIGURE 3A

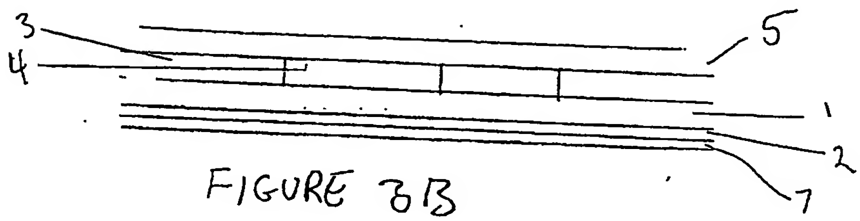

FIGURE 3B

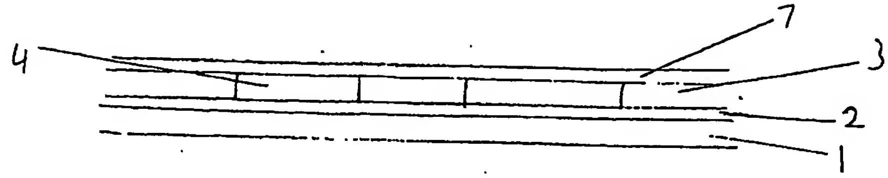

FIGURE 4

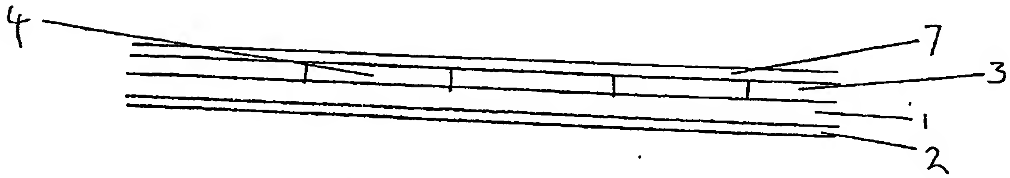

FIGURE 4A

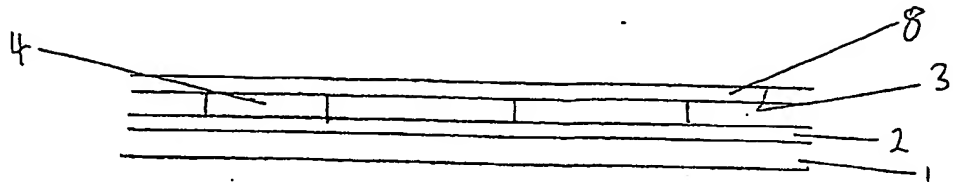

FIGURE 5.

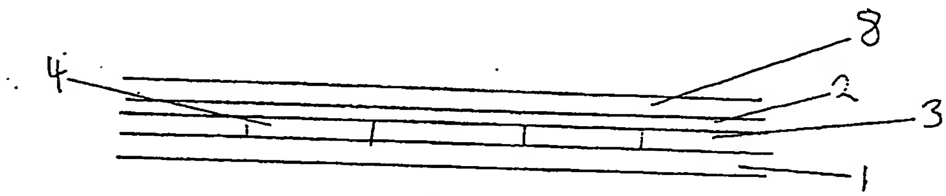

FIGURE 5A

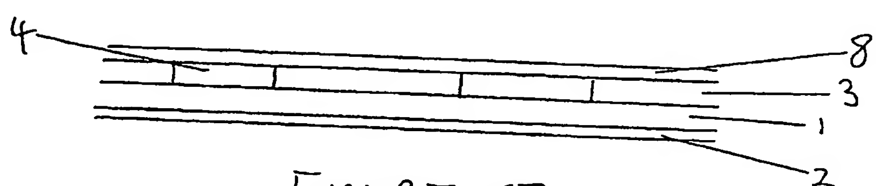

FIGURE 5B.

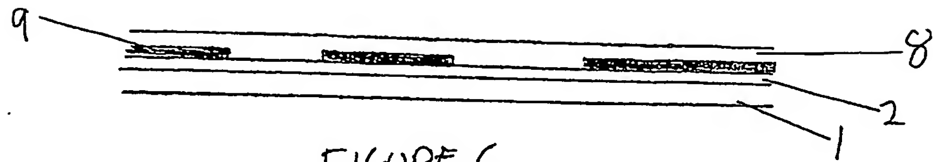

FIGURE 6.

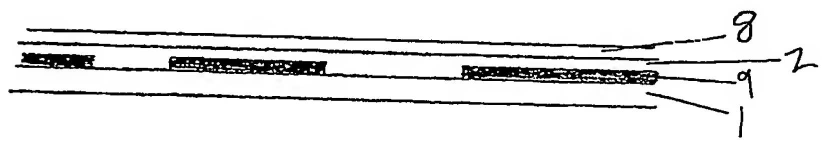

FIGURE 6A

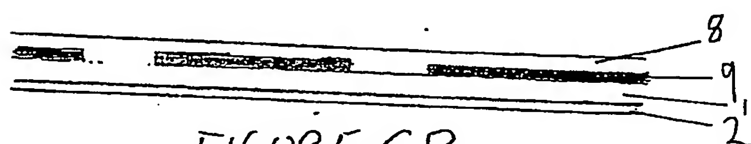

FIGURE 6B.

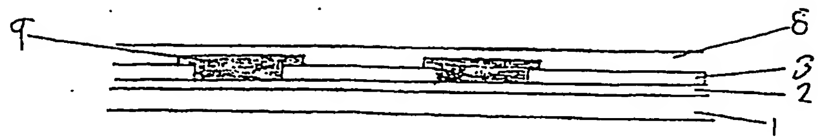

FIGURE 7.

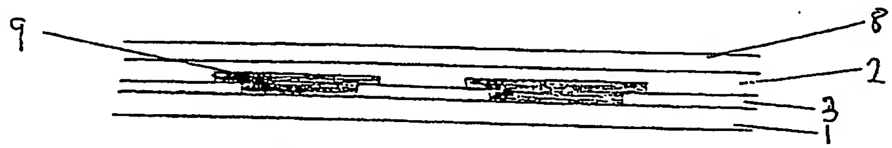

FIGURE 7A

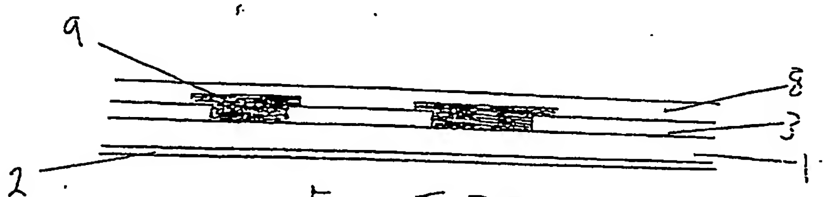

FIGURE 7B.

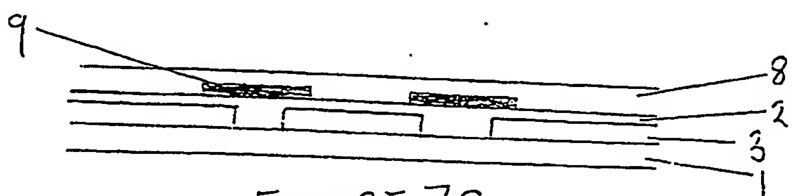

FIGURE 7C

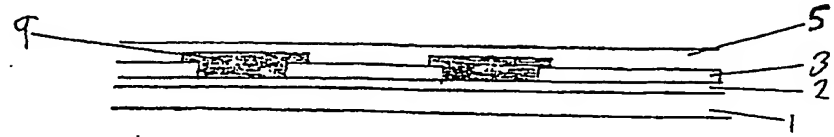

FIGURE 8.

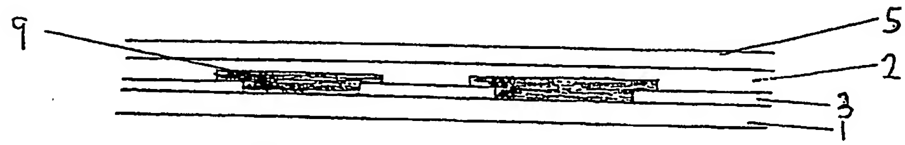

FIGURE 8A

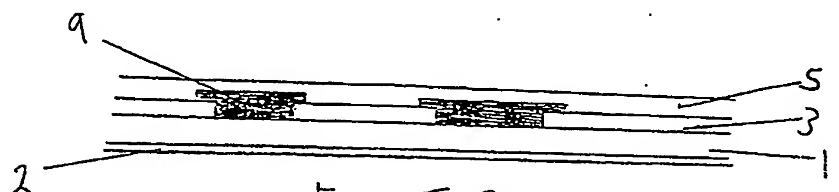

FIGURE 8B.

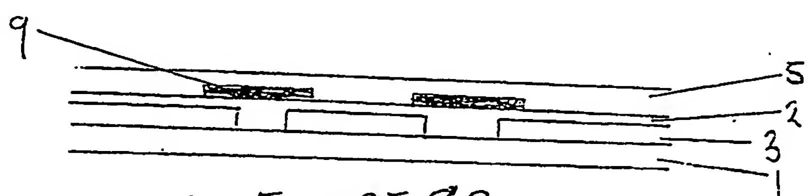

FIGURE 8C.

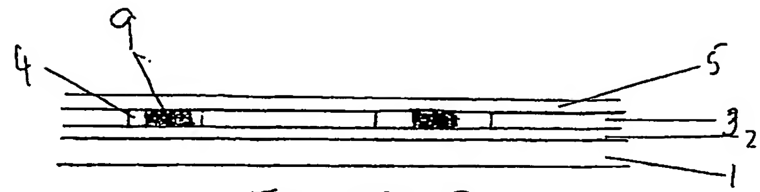

FIGURE 9

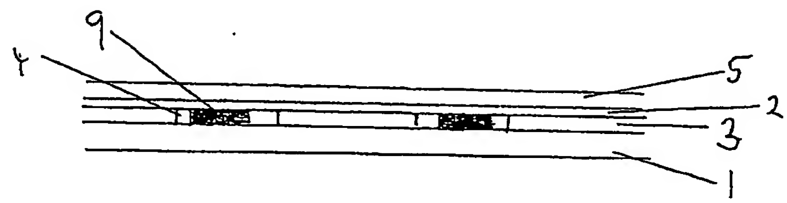

FIGURE 9A

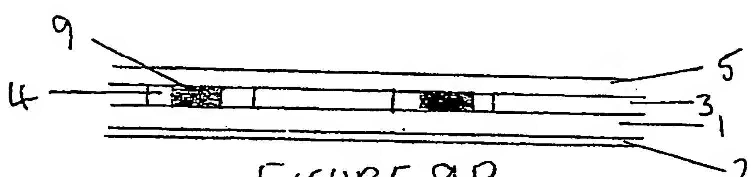

FIGURE 9B.

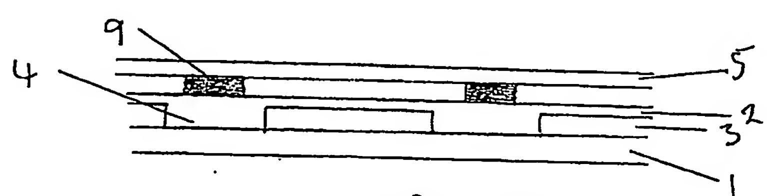

FIGURE 9C

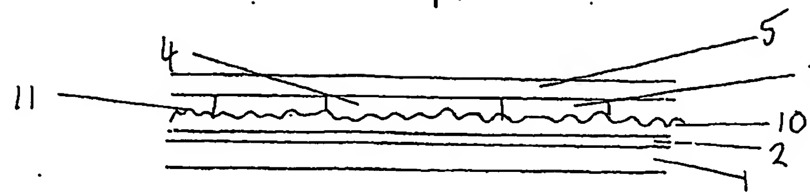

FIGURE 10

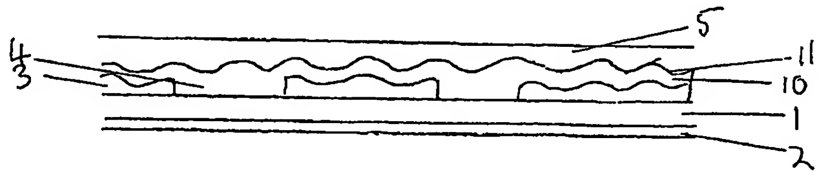

FIGURE 10 A.

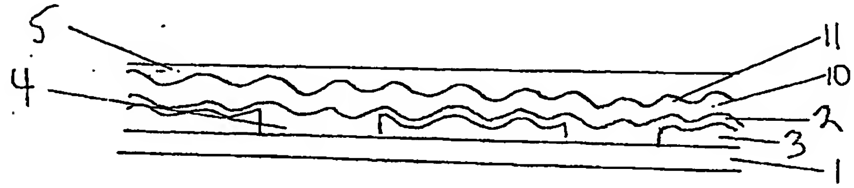

FIGURE 10 B

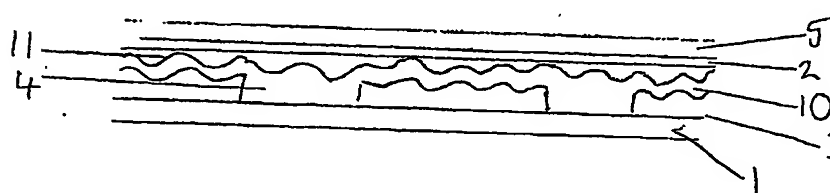

FIGURE 10C

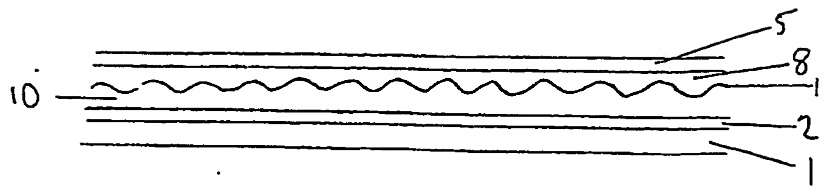

FIGURE 11.

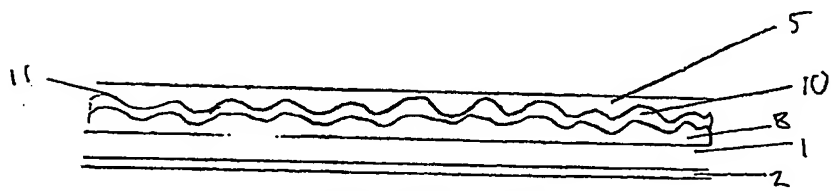

FIGURE 11A

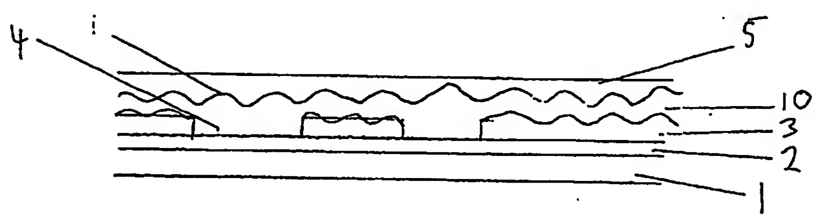

FIGURE 12

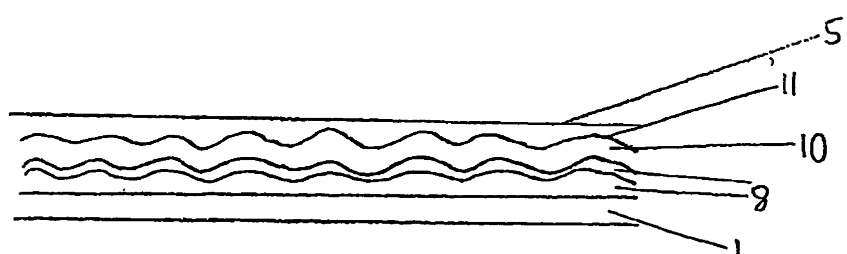

FIGURE 11B

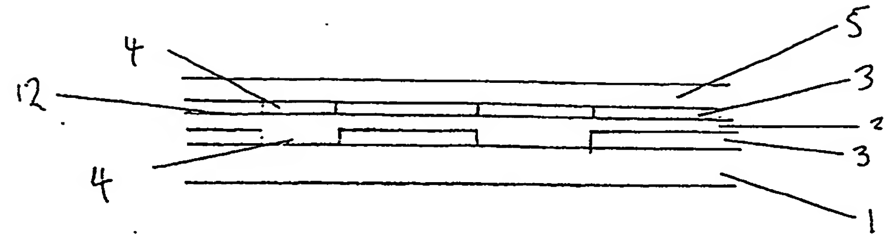

FIGURE 14

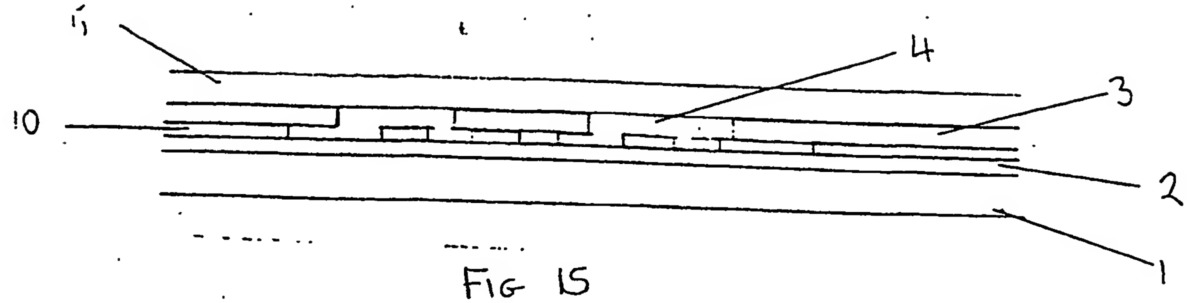

FIG 15

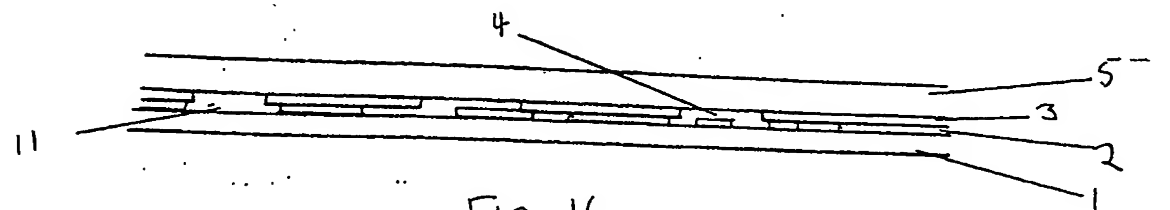

FIG 16